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(54) Apparatus for securing two parts together.

(57) Apparatus for use in securing an end or edge of a first member (42) to a surface 44 of a second member (46). The apparatus comprises a receptor (50) fixedly installed in a recess (54) in the surface (44) of the second member (46), and a connector (72) installed in a bore (58) formed in the end or edge of the fast member (42) with an end (74) of the connector (72) projecting outwardly the bore. The end (74) of the connector (72) is retained on push-fitting into receptor (50). An adjustor (70) installed in or on the first member (42) is adjustable for altering the position of the connector (72) in the bore (58) so as pull the first and second members (42, 46) towards each other. The adjustor (42) may be a rotatible cam (as shown), or a linear cam, or a rack-and-pinion arrangement. In Figure 6, the adjustor (110) is mounted in a body (114) at the end of the first member (42). The receptor (50) and the body (114) may be fixed by ribs, or screws or nails engaging a flange.

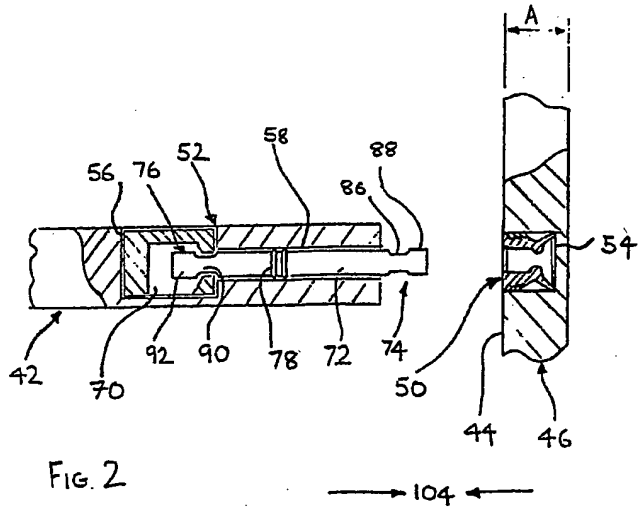

FIG. 2

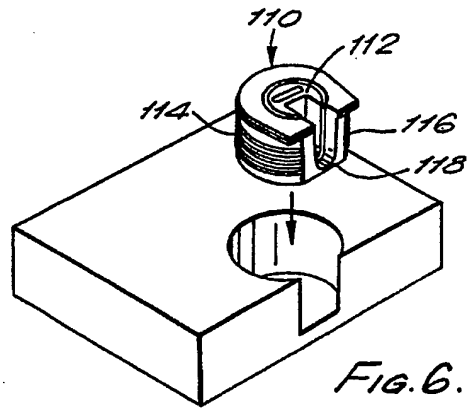

FIG. 6.

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At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

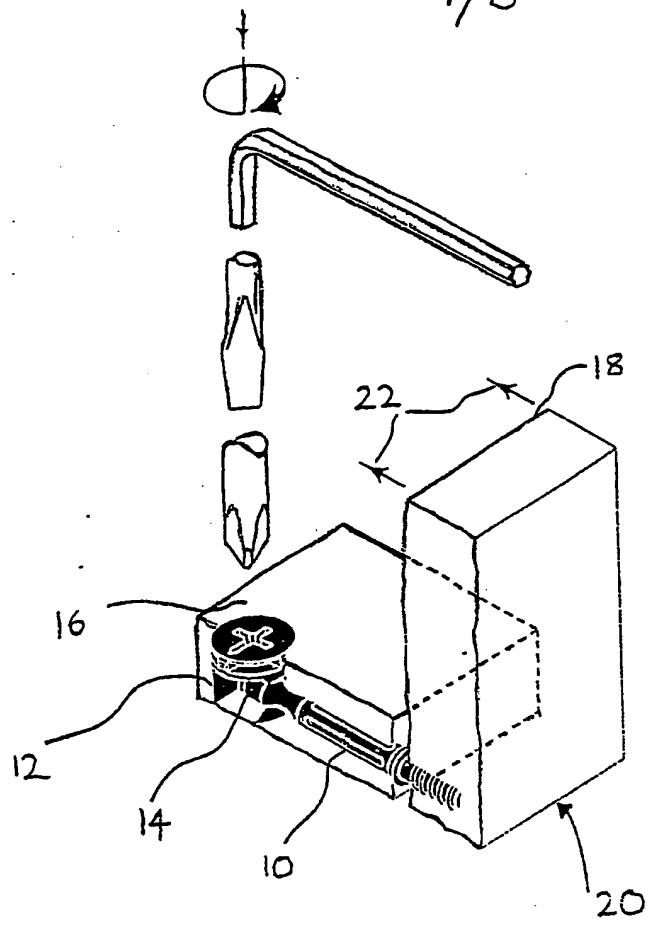
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FIG. 1

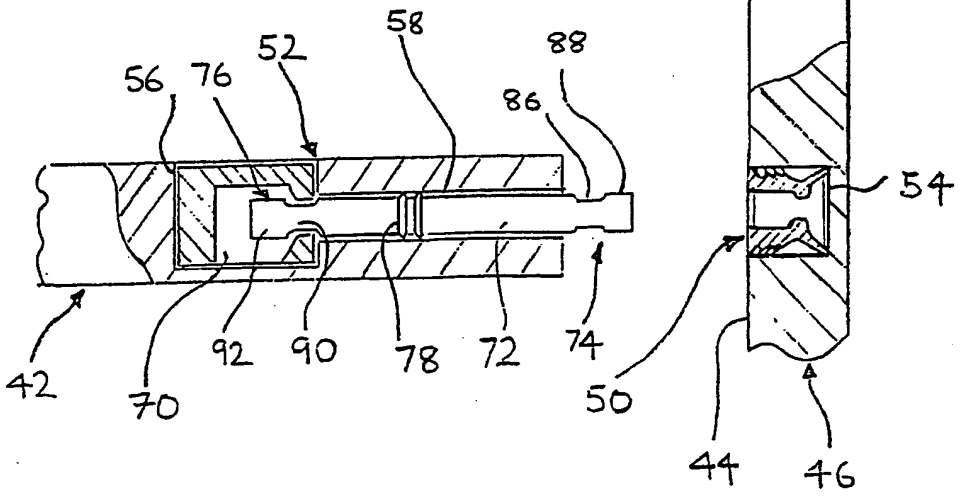
A
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FIG. 2

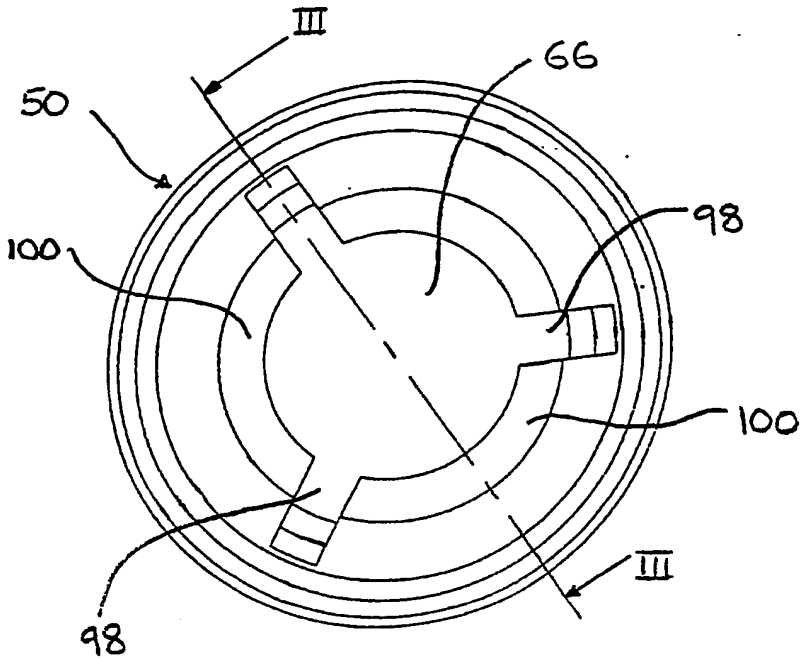

FIG 3

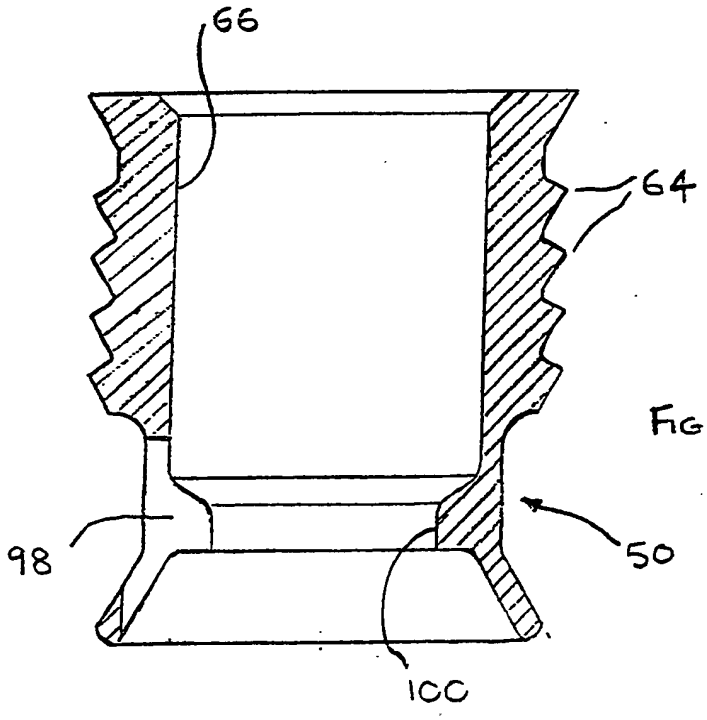

FIG 4

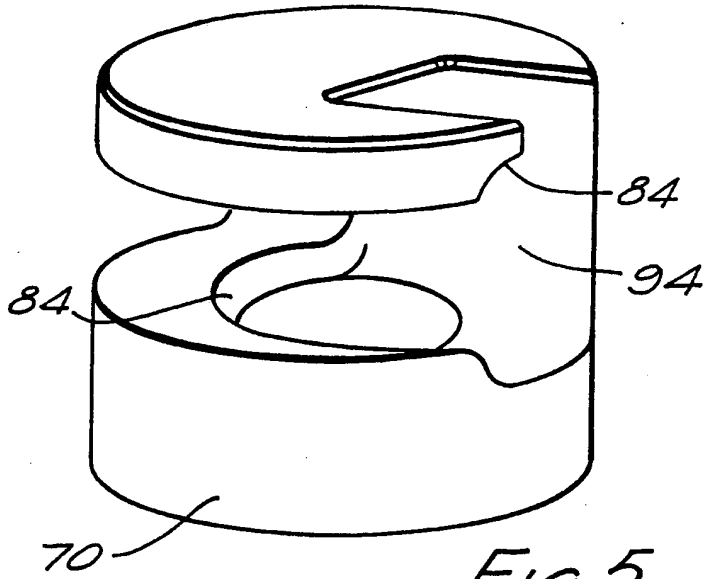

FIG. 5.

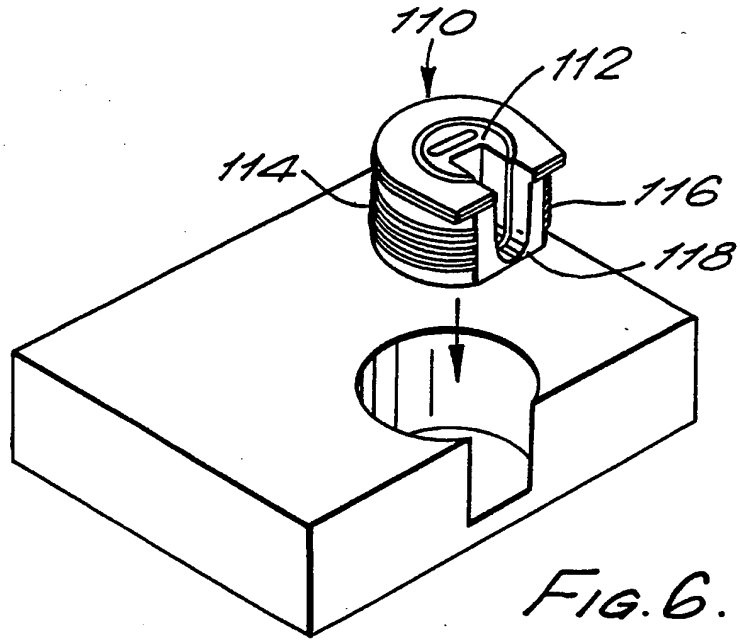

FIG. 6.

SECURING APPARATUS

The present invention relates to apparatus for use in securing together a joint between an end/edge of a first member and a surface of a second member. The invention is particularly, though not exclusively, useful for securing together furniture parts.

Home assembly or "knock-down" furniture is typically supplied to the customer in a 'flat pack' comprising a number of disassembled furniture parts and a package containing multiple-component securing devices for use in assembling the furniture, the furniture parts being provided with preformed recesses, bores and/or apertures for receiving the securing devices. Difficulty is often encountered in identifying which components of the securing devices should be fitted to the various recesses, bores, apertures etc. provided in the furniture parts and not only does this lead to customer frustration when assembling knock-down furniture, but also the incorrect fitting of components of the securing devices to the apertures etc. may cause damage to the apertures and/or to the components. It will also be appreciated that where the furniture to be assembled requires many securing device components such as the screw-threaded pin member 10 shown in Figure 1 of the

accompanying drawings, the screwing of these components into the respective furniture parts involves considerable labour for the assembler. A further problem that sometimes occurs is that an insufficient number of securing devices is provided in the 'flat pack'.

For the above and other reasons, manufacturers of knock-down furniture would prefer to pre-assemble the securing device components to the furniture parts before they are despatched from the factory, so that the consumer is required only to bring the furniture parts together and to engage and tighten the securing devices in order to assemble the furniture. However, as will now be described, the known securing devices are not entirely suitable for this purpose.

Figure 1 shows a known form of securing device which is commonly used for securing furniture parts in knock-down furniture. The device comprises a pin member 10 and a drum 12. The drum has a cam surface which engages the head 14 of the pin. The drum is designed to be received in a recess in one furniture part 16 and the pin member is designed to be screwed into a major surface 18 of a second furniture part 20 and, as indicated, rotation of the drum engaging the pin causes the two furniture parts to be drawn together as indicated by arrows 22.

It will be appreciated that if a securing device component such as pin member 10 is pre-assembled to a major surface of a furniture part as shown in Figure 1, particularly where a number of such components project from that major surface and even more so if a number of furniture parts are each so-fitted with projecting securing device components, it then becomes difficult to 'flat pack' the furniture parts. A further problem arises in that movement of the panels relative to one another during transit may result in damage occurring to the furniture parts and particularly the major surfaces thereof if these come into contact with the projecting securing device components of other furniture parts.

An object of the invention is to at least partially overcome some of the above-mentioned problems.

The present invention resides in the concept of providing securing devices in the form of cooperating male and female components which may be pre-assembled to furniture parts of knock-down furniture which is to be 'flat packed' for despatch, the male connector components being received in bores formed in end or edge surfaces of some of the furniture parts and having projecting portions which are adapted to be engaged in push-fit manner with respective female

components which are flush-fitted in recesses formed in the major surfaces of other furniture parts for securing the respective furniture parts together, there further being provided components which are operable to adjust the effective lengths of the male connector components so that the respective furniture parts can be tightened together.

The present invention in one of its aspects thus provides apparatus for use in securing a joint between an end/edge of a first member and a surface of a second member, said apparatus comprising a female member to be fixedly installed in a recess in the surface of the second member, a male member to be installed in a bore formed in the end/edge of the first member with an end portion projecting outwardly from the bore, the end portion of the male member and the female member being formed so that the former can be push-fitted into the latter and held therein against withdrawal, and adjustor means to be installed in or on the first member in operative relationship with the male member and adjustable for adjusting the position of the male member in said bore for pulling the first and second members towards each other.

It is not essential to the present invention that the male member be installed in bores formed in the end/edge of the respective member; they could

alternatively be installed with the adjustment means in appropriately formed recesses provided in the respective end/edge surfaces. Thus, according to another aspect, the present invention provides apparatus for use in securing a joint between an end/edge of a first member and a surface of a second member, said apparatus comprising a female member to be fixedly installed in a recess in the surface of the second member, a male member having an end portion formed to be push-fitted into the female member, the end portion of the male member and the female member being formed so that with the former push-fitted into the latter the former will be held in the latter against withdrawal, and adjustor means to be installed in or on the first member in operative relationship with the male member and adjustable for adjusting the position of the male member for pulling the first and second members towards each other.

Yet more generally, another aspect of the invention provides apparatus for use in forming a joint, said apparatus comprising a female part to be fixedly installed in a recess in a second joint member, a male part having an end portion which can be push-fitted into the female part for securing the male and female parts together, and adjustor means to be secured to a first joint member and engageable with

the male part for adjustably drawing the joint members together.

According to yet another aspect, the invention provides apparatus for securing together two furniture parts, the apparatus comprising a receptor means having a body portion provided with fixing means whereby said receptor means is fixable in an aperture provided in a second of said furniture parts and an adjustable connector means adapted to be retainably received in at least one aperture provided in a first of said furniture parts, said adjustable connector means comprising an adjustor means and an elongate connector element having first and second engagement portions disposed opposite end regions thereof, said first engagement portion being insertable into said receptor means in push-fit manner so as to be engageably received therein and said second engagement portion being adapted to cooperably engage said adjustor means whereby in use of the apparatus, the disposition of said connector element may be lengthwise adjusted so as to pull the two furniture parts together.

Preferably, said adjustment means comprises cam means adapted to cooperably engage the connector element/male part.

Advantageously, the connector element/male part

comprises means for gripping a joint forming member/ furniture part.

Preferably, the receptor means/female part is provided with retention means deflectable to engage a recess formed in an end portion of the connector element/male part.

Preferably, the receptor means/female part comprises a generally cylindrical body portion having a through-aperture adapted to receive said end portion and the retention means comprises at least one wing member extending inwardly of the aperture wall.

The receptor means/female part may be provided with external projections for engaging the wall of a recess in which the receptor means/female part is to be fitted.

Some embodiments of the invention, which are given by way of example only, will now be described with reference to the accompanying drawings in which:

Figure 1 shows securing apparatus for securing together two furniture parts according to the prior art;

Figure 2 is a sectional view of two joint-forming members fitted with apparatus according to an embodiment of the present invention;

Figure 3 is a plan view of a female part of the apparatus of Figure 2;

Figure 4 shows a section on line III-III of Figure 3;

Figure 5 is a perspective view of the adjustor means of the apparatus of Figure 2; and

Figure 6 shows an alternative adjustor means for the securing apparatus.

Referring to Figures 2 to 4, an apparatus for use in securing a joint between an edge/end surface 40 of a first member 42 and a major surface 44 of a second member 46 of an item of knock-down furniture comprises a receptor means 50 and an adjustable connector means 52. In use, the receptor means is fixed in an aperture 54 provided in the surface 44 of the second member and the adjustable connector means is retainably received in a first aperture 56 and a further aperture 58 provided in the first member 44.

The receptor means or female part 50 comprises a generally cylindrical body portion 62 and is intended to be push-fitted into an aperture, such as aperture 44, having a predetermined size. Circumferential ribs or barbs 64 are formed on the outer periphery of the body portion such that the resistance to withdrawal of the female part from aperture 44 is substantially greater than the force required for its installation so that once installed, the female part is removable from the aperture only by the application of a removal

force which would render it unfit for further use. The body portion includes a through aperture 66 intended to receive a portion of adjustable connector means 52.

The adjustable connector means comprises an adjustor means 70 and an elongate connector element or male part in the form of a dowel-pin 72. The dowel-pin comprises first and second engagement portions 74, 76 formed at opposite end regions thereof and gripping means disposed intermediate the engagement portions. The gripping means comprises circumferentially extending ribs 78 formed on the dowel-pin which on insertion of the dowel-pin into aperture 58 grip the aperture wall so that the dowel-pin is retainably received therein. It will be understood that the gripping means may alternatively be provided by diamond shape knurls or by providing any other form of projection on the pin surface. The engagement portions 74, 76 comprise respective circumferential grooves 86, 90 formed in the dowel-pin and 'heads' 88, 92 defined thereby.

The adjustor means is in the form of a rotatable drum 70 having camming surfaces 84 which are adapted to cooperably engage second engagement portion 76 which is engageable therewith by insertion of the head 92 into the drum member via gap 94 formed therein;

subsequent rotation of the drum bringing the camming surfaces 84 into engagement.

The rotatable drum is provided with an access opening (not shown) for receiving an adjusting tool. The skilled man will appreciate that any form of adjusting tool may be employed and that the arrangement shown in Figure 1 in connection with the prior art would be equally applicable to the drum 70.

The body portion of female part 50 is provided with retention means extending inwardly of the through-aperture. The retention means comprises an annular ledge divided by slits 98 so as to define a plurality of resiliently deflectable ledge-elements 100 adapted to engage the groove 86 and head 88 of the first engagement portion. As shown in Figure 4, the slits 98 extend through the annular ledge and the body portion wall to provide a greater flexibility in the female part thereby reducing the force required for insertion of the dowel-pin to the engageably received portion.

In use, the female part 50, male part 72 and drum member 70 may each be fitted to the respective members 42, 46 which are then packaged, in a disassembled condition, ready for transport. The female part is push-fitted into the recess 54 of member 44 and firmly fixed therein by means of the ribs 64. Rotatable drum

70 and dowel-pin 72 cooperate to retain each other within their respective receiving apertures 56, 58 in member 42. The drum and dowel-pin are fitted to member 42 by first inserting the drum into recess 56 and then inserting the dowel-pin into aperture 58 until head 92 is received internally of the drum via gap 94 after which the drum is rotated by means of a suitable tool to bring the camming surfaces into engagement. It will be appreciated that this engagement prevents either the drum or dowel-pin from being dislodged from their respective apertures. The gripping ribs 78 serve to prevent axial displacement of the dowel-pin should the camming surfaces be disengaged by rotation of the drum caused by vibration in transit.

It will thus be appreciated that the components of the securing apparatus are pre-assembled to the joint-forming members with the female part fixably received in a surface of one of the members and the adjustor means and male part retainably received in the other member such that substantially no part of the apparatus projects from any of the major surfaces of the members which are thus readily placed one against the other for flat packing. The portion of the dowel-pin which projects beyond the surface of the member in which it is received, projects from an edge

or end surface of the member and will not therefore contact the major surfaces of the other when flat packed. It will be appreciated that the dowel-pin can be arranged to project from the aperture in which it is received by only the amount required to allow engagement with the ledge element on insertion into the female part and by suitable selection of component dimensions this projection may be minimized.

It will also be appreciated that the assembler of the joint member is required only to bring the two members together such that the dowel-pin is inserted into the female part and the ledge-elements 100 brought into engagement with engagement portion 74, whereby the two members are connected, and then rotate the drum member whereby the cooperable engagement of the camming surfaces with engagement portion 76 draws the members together to a secured condition as indicated by arrows 104 in Figure 2.

A useful feature of the apparatus is that the members may be connected by a simple push-fit and items of furniture may be loosely assembled in this way. Once the assembler has connected all the furniture members it is then necessary only to tighten the joints to complete the assembly. The 'loose' pre-assembly of the furniture into a stand alone condition allows the furniture items to be easily assembled by

a single assembler.

It will be understood that rotation of the drum 70 draws the dowel-pin in the aperture 58 toward the drum axis whereby the dowel-pin disposition is lengthwise adjusted to pull the members 42, 46 together to form a secure joint. Accordingly, the gripping action of the ribs 78 is required only to be sufficient to resist displacement of the dowel-pin in transit but not so great as to prevent the lengthwise adjustment by the assembler's operation of the rotatable drum.

An alternative adjustor means 110 for the apparatus is shown in Figure 6. Adjustor means 110 comprises a rotatable drum member 112 corresponding to drum 70 which is disposed internally of a generally cylindrical body member 114. Body member 114 is provided with a plurality of circumferential ribs 116, whereby the body member may be fixed in a recess by push-fitting therein. Although adjustor means 110 is applicable to the arrangement shown in Figure 2, it will be appreciated that the aperture in which it is to be installed, may be formed adjacent an edge of the member, as shown in Figure 6, such that the dowel-pin is not received in a further aperture but merely projects from the drum member. This is because the cooperation of the dowel-pin is not required for

retaining the drum member in its recess. When the body member is to be fitted to an aperture at the edge of a member, it may be formed as a generally cylindrical body with a flat surface 118 formed thereon which is intended to be flush with an edge/end surface of the member when installed. It will be understood that in this case the dowel-pin is retainably connected with the joint-forming member only by cooperable engagement with the camming surfaces of the drum 112. An advantage of this arrangement is that it allows the use of a substantially shortened version of dowel-pin 72 which need not be provided with gripping means such as the ribs 78. Thus a reduced operating force may be required. It will be understood that where the body member 114 comprises a flat surface 118 the ribs 116 will extend only over the arcuate portion thereof as indicated in Figure 6.

Advantageously, the head 92 of the dowel pin and the rotatable drum 70 or 112 may be provided with respective sets of cooperably engageable protrusions or depressions as disclosed in the applicant's copending application publication number GB2246826A. Such an arrangement provides a plurality of locked positions of the drum and dowel-pin and would be particularly applicable where the dowel-pin is

intended not to be retainably received in a joint-member aperture. It will be appreciated that with the drum and dowel-pin engaged in one of the locked positions the dowel-pin would be securely retained for transit purposes. Additionally, such an arrangement provides for greater security of the joint when formed.

It is to be understood that the adjustor means is not limited to a rotary cam but may in one alternative comprise a linear cam which is actuable against the male part with a wedging action by adjustable movement in directions intersecting the longitudinal axis of the dowel-pin. It is also envisaged that a rack and pinion type adjustor would be applicable to the securing apparatus.

It is also to be understood that while female part 50 and body member 114 are described as being fixable in their respective apertures by the gripping ribs 64, 116, other forms of gripping projection may be used. Alternatively, part 50 and body member 114 may be fixed to the joint members by alternative means. For example, each or either could be provided with flanges which would be substantially flush with the joint member surface when the respective part is fitted into an aperture with fixing being by means of screws, nails or the like penetrating the flange. As

a further alternative, adhesives may be used.

It is envisaged that the female part would be manufactured as a one piece plastics moulding whilst the adjustor means could be manufactured by die casting in a suitable zinc or aluminium based die casting alloy. However, the above-described examples of materials and manufacturing method are not to be taken as limiting.

It will be further appreciated that the configuration of a female part having internally disposed retention means for engaging the male part provides a particularly compact means for forming a connection between the joint members which allows the apparatus to be used in connection with members having a dimension A of as little as 15 mm.

Many modifications and variations of the apparatus will be readily apparent to those skilled in the art which may be deemed to fall within the scope of the invention as set forth in the appended claims.

CLAIMS:

1. Apparatus for securing together two furniture parts, the apparatus comprising a receptor means having a body portion provided with fixing means whereby said receptor means is fixable in an aperture provided in a second of said furniture parts and an adjustable connector means adapted to be retainably received in at least one aperture provided in a first of said furniture parts, said adjustable connector means comprising an adjustor means and an elongate connector element having first and second engagement portions disposed opposite end regions thereof, said first engagement portion being insertable into said receptor means in push-fit manner so as to be engageably received therein and said second engagement portion being adapted to cooperably engage said adjustor means whereby in use of the apparatus, the disposition of said connector element may be lengthwise adjusted so as to pull the two furniture parts together.

2. Apparatus as claimed in claim 1, wherein said adjustor means comprises a rotatable drum member having at least one camming surface for cooperably engaging said first engagement portion.

3. Apparatus as claimed in claim 2, wherein said rotatable drum is disposed internally of a body member, which body member is provided with a plurality of ribs extending over a portion of the circumference thereof for fixably retaining said body member in said at least one aperture.

4. Apparatus as claimed in claim 1, 2 or 3, wherein said connector member is provided with gripping means disposed intermediate said first and second engagement portions for gripping a wall of a further aperture of said first furniture part.

5. Apparatus as claimed in claim 4, wherein said gripping means comprises at least one circumferential rib formed on said connector member.

6. Apparatus as claimed in any one of the preceding claims, wherein said receptor means body portion is provided with having retention means extending inwardly of a body portion aperture for engaging said first engagement portion.

7. Apparatus as claimed in claim 6, wherein said retention means comprises a resiliently deflectable annular ledge.

8. Apparatus as claimed in claim 7, wherein the ledge is divided by a plurality of slits so as to define a plurality of resiliently deflectable ledge-elements.

9. Apparatus as claimed in claim 6, 7 or 8, wherein said second engagement portion comprise a head defined by a circumferential groove formed in the connector member such that on insertion into the receptor means the head passes through and engages behind the retention means.

10. Apparatus as claimed in any one of the preceding claims, wherein said fixing means comprises at least one circumferential rib formed on the body portion.

11. Apparatus for use in securing a joint between an end/edge of a first member and a surface of a second member, said apparatus comprising a female member to be fixedly installed in a recess in the surface of the second member, a male member to be installed in a bore formed in the end/edge of the first member with an end portion projecting outwardly from the bore, the end portion of the male member and the female member being formed so that the former can be push-fitted into the latter and held therein against withdrawal, and

adjustor means to be installed in or on the first member in operative relationship with the male member and adjustable for adjusting the position of the male member in said bore for pulling the first and second members towards each other.

12. Apparatus for use in securing a joint between an end/edge of a first member and a surface of a second member, said apparatus comprising a female member to be fixedly installed in a recess in the surface of the second member, a male member having an end portion formed to be push-fitted into the female member, the end portion of the male member and the female member being formed so that with the former push-fitted into the latter the former will be held in the latter against withdrawal, and adjustor means to be installed in or on the first member in operative relationship with the male member and adjustable for adjusting the position of the male member for pulling the first and second members towards each other.

13. Apparatus for use in forming a joint, said apparatus comprising a female part to be fixedly installed in a recess in a second joint member, a male part having an end portion which can be push-fitted into the female part for securing the male and female

parts together, and adjustment means to be secured to a first joint member and engageable with the male part for adjustably drawing the joint members together.

14. Apparatus as claimed in claim 11, 12 or 13, wherein the female part is provided with retention means deflectable to engage a recess formed in said end portion of the male part.

15. Apparatus as claimed in claim 14, wherein the female part comprises a generally cylindrical body portion having a through-aperture adapted to receive said end portion and said retention means comprises at least one wing member extending inwardly of the aperture wall.

16. Apparatus as claimed in any one of claims 11 to 15, wherein said female part is provided with external projections for engaging the wall of said recess of the second joint member.

17. Apparatus as claimed in any one of claims 11 to 16, wherein said male part is an elongate pin member.

18. Apparatus as claimed in claim 17 when dependent on claim 14 or 15, wherein said recess is a

circumferential groove formed in said pin member.

19. Apparatus as claimed in any one of claims 11 to 18, wherein said adjustment means comprises cam means adapted to cooperably engage the male part.

20. Apparatus as claimed in claim 19, wherein said cam means comprises a rotatable drum having at least one camming surface.

21. Apparatus as claimed in claim 20, wherein said rotatable drum is disposed within a generally cylindrical housing.

22. Apparatus as claimed in claim 21, wherein said housing is provided with external projections for engaging a recess formed in the first joint member and thereby resisting withdrawal of the housing from the recess.

23. Apparatus as claimed in any one of claims 11 to 22, wherein said male part is provided with means for gripping the first joint member.

24. Apparatus as claimed in any one of the preceding claims, wherein said receptor means/female part

comprises a plastics moulding.

25. A package of knock-down furniture components comprising two disassembled furniture parts fitted with securing apparatus as claimed in any one of the preceding claims.

26. Apparatus substantially as hereinbefore described with reference to Figures 2 to 6.

Patents Act 1977
Examiner's report to the Comptroller under Section 17 (The Search Report) -24-

Application number
GB 9309910.9

Relevant Technical fields

(i) UK Cl (Edition L) F2M (MB2, MC1)

(ii) Int Cl (Edition 5) F16B 5/06 12/20

Search Examiner
P M WELLER

Databases (see over)

(i) UK Patent Office

(ii) ONLINE DATABASE: WPI

Date of Search
17 AUGUST 1993

Documents considered relevant following a search in respect of claims 1-26

Category (see over)	Identity of document and relevant passages		Relevant to claim(s)
X	GB 1573172 A	(HEINZE) Figures 1,9	1,11,12, 13
X	GB 1500537 A	(JACHMANN) Figures 1,2	1,11,12, 13
X	GB 0903767 A	(HENSEL) Figure 4	1,11,12, 13

Category	Identity of document and relevant passages	Relevant to claim(s)

Categories of documents

X: Document indicating lack of novelty or of inventive step.

Y: Document indicating lack of inventive step if combined with one or more other documents of the same category.

A: Document indicating technological background and/or state of the art.

P: Document published on or after the declared priority date but before the filing date of the present application.

E: Patent document published on or after, but with priority date earlier than, the filing date of the present application.

&: Member of the same patent family, corresponding document.

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